

## SECTION 6. CATEGORY III OPERATIONS

### 611. GENERAL.

A. This section contains concepts, direction, and guidance to be used by inspectors for evaluating and approving or denying requests for authorization to conduct CAT III all-weather terminal area (AWTA) operations. All CAT III operations using aircraft, airborne equipment, ground-based equipment, or, concepts or procedures which are new to a particular operator require approval. In addition, all CAT III operations at airports and runways new to a particular operator require approval even though previously approved aircraft, airborne equipment, ground-based equipment, concepts and procedures are used in those operations. This section contains an amplification of the general concepts, policies, direction, and guidance covered in previous sections of this chapter. Specific standards are provided for inspectors evaluating CAT III AWTA operations with airborne and ground-based equipment which have well understood operational characteristics and limitations. In cases where an operator requests approval to conduct CAT III AWTA operations using equipment, concepts, and/or procedures not addressed in these standards, a request for policy and guidance must be forwarded through the appropriate Regional Flight Standards Division (RFSD) to AFS-400.

B. CAT III AWTA operations are defined, for purposes of this handbook, as all approach and landing operations conducted in instrument meteorological conditions using CAT III approach procedures to CAT III operating minimums. CAT III operating minimums are those minimums which specify a decision height (DH) lower than 100 feet (30 meters) above the touchdown zone and a controlling RVR below RVR 1200 (350 meters). CAT III operating minimums also include those operations conducted with an alert height (AH) of 100 feet (30 meters) or less above the touchdown zone (no DH) and a controlling RVR below RVR 1200 (350 meters).

(1) *Types of CAT III Operations.* The only types of CAT III operations which can be currently authorized for use by U.S. operators are ILS-based. MLS-based CAT III operations, however, may be conducted in the near future, provided these operations are restricted to an “ILS-like” operation which has at least a 4 nm to 5 nm straight-in final approach segment. The flight control

laws (computer logic) used in most CAT III flight guidance and control systems (for example, autoland systems) require that a final approach segment of at least this length to perform their intended function in CAT III operation. Before CAT III, MLS operations with segmented and/or curvilinear approach paths with straight-in final approach segments significantly less than 5 nm can be conducted, most existing flight guidance and control systems will have to be modified and recertificated to CAT III criteria. Certain new aircraft, however, will probably be configured with the necessary equipment and certificated for segmented and curvilinear approach paths with very short, straight-in final approach courses.

(2) *Kinds of CAT III Operations.* There are two different and distinct kinds of CAT III operations. These kinds of operations are fail-passive operations and fail-operational operations. Fail-passive operations are restricted to CAT IIIa weather conditions (DH 50/RVR 700). Fail-operational operations can be conducted in either CAT IIIa or CAT IIIb weather conditions (see paragraph 613 C of this section for further descriptions of fail-passive and fail-operational operations).

(3) *Objective of CAT III Operations.* The essential difference between CAT III AWTA operations and CAT I and CAT II operations is that a CAT III operation places a greater reliance on the guidance provided by the airborne and ground-based guidance equipment. The guidance provided by the equipment must continue through touchdown in CAT IIIa operations and through touchdown and rollout to a safe taxi speed in CAT IIIb operations. In contrast to other types of operations, CAT III operations do not ensure sufficient external visual cues for the pilot to manually control the aircraft during flare and landing. The primary objective of CAT III operations is to provide a level of safety equivalent to CAT I and CAT II operations without the use of these visual cues. To meet this objective, the instrument approach procedure must provide for a safe and orderly transition from the en route phase of flight to a landing or to a missed approach (which could include a momentary touchdown during the go-around maneuver), and then a transition back to the en route environment for diversion to an alternate airport. CAT III instrument approach procedures and ATC procedures must also include adequate protection from obstacles (mobile or fixed) near the landing surface to assure that a go-around

can be safely initiated from any point in the approach and landing before touchdown. The desired level of safety for CAT III operations is achieved by the following enhancements:

(a) The airborne equipment and ground-based equipment must assure increased precision in flightpath control. The increased reliability and precision of flightpath control (as compared to CAT I and CAT II systems) is achieved through highly reliable and precise ground-based equipment and airborne systems. These systems are capable of guiding the aircraft with significantly increased precision to touchdown or through rollout, as appropriate.

(b) Special flightcrew qualification and training are also required to assure that the aircraft is operated with the required degree of precision during these operations.

(c) The aircraft performance and equipment requirements associated with a missed approach from very low altitudes are enhanced to ensure that these operations can be safely conducted even if a momentary touchdown occurs on the runway after the go-around is initiated.

(d) Additional visual aids are required to enhance seeing-conditions during the final stages of landing, flare, rollout, and taxi operations.

(e) Special criteria are established to provide additional obstacle and terrain clearance to accommodate missed approaches from very low altitudes, which may include a momentary touchdown on the runway after the go-around is initiated.

(f) Special requirements are established to provide enhanced protection for the ILS/MLS signals during the final stages of landing, flare, and rollout to ensure that these signals are not disturbed during these critical phases of flight.

(g) More stringent criteria are specified for the profile of the pre-threshold terrain to ensure that the flight guidance and control systems function properly during the final stages of approach, flare, and landing.

(h) Special operational and ATC procedures and/or limitations are established to ensure the overall safety and efficiency of the operation.

**613. CAT III OPERATIONAL CONCEPTS.** The weather and environmental conditions encountered in CAT

III AWTAs operations severely restrict seeing-conditions. External visual reference is not acquired until the aircraft reaches a very low altitude. Typically, external visual references begin to become available below 100 feet in CAT IIIa operations and below 50 feet in CAT IIIb operations. Even though external visual references are usually available before touchdown, the seeing conditions are not sufficient for the pilot to consistently perform a safe manual landing. Therefore, the aircraft must be controlled by instruments and special equipment throughout the approach, flare, and touchdown (deceleration for rotorcraft) in CAT IIIa weather conditions and through rollout to a safe taxi speed (air taxi or hover for rotorcraft) in CAT IIIb weather conditions. Due to the reduced seeing-conditions and the hazards associated with a pilot's attempts to manually maneuver the aircraft to landing in those seeing-conditions, the precision of the flight guidance and control system and the overall precision of flightpath control must have certain capabilities. These capabilities include the safe delivery of the aircraft to touchdown in CAT IIIa weather conditions and through touchdown and rollout to a safe taxi speed in CAT IIIb conditions.

*A. Decision Height (DH) and Alert Height (AH).* All CAT IIIa fail-passive operations are conducted in accordance with the decision height (DH) and RVR concepts. All CAT IIIa and CAT IIIb fail-operational operations are normally conducted in accordance with the alert height and RVR concepts (see paragraph 613 C). Decision heights are only used with fail-operational systems in very unique situations (see AC 120-28). DH's and AH's are never used together in any operation since the DH requires that external visual reference be established before passing a specified point and AH does not. The very limited seeing-conditions available in CAT III operations require additional criteria to assure that an adequate level of safety is achieved and maintained when operating in this environment (see paragraph 611 B(2)).

*B. CAT III Operating Minimums.* CAT III operating procedures and minimums are established to assure that the desired level of safety is achieved when aircraft are operated in CAT III seeing-conditions. These operating minimums are based on the DH and RVR concepts for fail-passive operations and the AH and RVR concepts for fail-operational operations (see subparagraph 613 C that follows). These operating minimums establish the minimum safe heights for instrument flight (DH 50 for fail-passive operations and touchdown for fail-operational operations) and the minimum controlling RVR's necessary to safely complete the operation being conducted with a particular aircraft. These operating minimums are established in full consideration of the required CAT III: operational concepts;

airborne equipment; ground-based, visual and electronic equipment; operating procedures; and, the pilot training and qualifications required for these operations. These operating minimums, when combined with other CAT III requirements, assure that the combination of information from external visual sources and the aircraft instrument and equipment is sufficient to enable properly qualified pilots to safely operate the aircraft along the desired flightpath, touchdown, and safely rollout. As the quality and quantity of external visual information decreases due to the reduced seeing conditions (for example, going from CAT II to CAT IIIa to CAT IIIb), the quality and quantity of instrument information, the capability of the airborne and ground-based CAT III system, and the proficiency of the flightcrew must be increased to maintain the desired level of safety.

*C. Kinds of CAT III Operations.* There are two different and distinct kinds of CAT III operations: fail-passive operations and fail-operational operations.

(1) *Fail-Passive Operations.* Fail-passive operations are restricted to CAT IIIa and must use a DH of 50 feet (15 meters) and a controlling RVR of RVR 700 (200 meters). Fail-passive operations are also currently (1991) only authorized for aircraft smaller than a DC-10 or L-1011 due to approach geometry factors such as wheel to glideslope antenna height and wheel to pilot's eye height. Inspectors must require that operators provide proof-of-concept testing is required before approving fail-passive CAT III operations with a DC-10 or L-1011 or larger size aircraft. As the name implies, fail-passive CAT III systems are permitted to fail below 100 feet AGL, under certain remote circumstances, provided that the flight guidance and control system always fails passively (does not disturb the aircraft's flightpath when it fails) and the flightcrew immediately receives an aural and visual warning of system failure. Since a fail-passive system is permitted to fail, a DH must be used to assure that, before passing 50 feet AGL, the flightcrew establishes external visual reference with the touchdown zone to determine that the flight guidance and control system is functioning properly and to assure that the aircraft is being properly delivered to the runway. Extensive research and operational experience have shown that pilots may not always have sufficient external visual cues in certain CAT III weather conditions to properly conduct this assessment before passing 50 feet AGL if the controlling RVR is less than RVR 700. These research programs clearly show that a go-around is mandatory if the flight guidance and control system fails before touchdown during fail-passive operations in CAT III weather conditions. These research programs also

clearly show that, if the system fails below 100 feet AGL, the external visual cues are not sufficient to permit the pilot to use these cues to consistently and safely manually complete the landing in certain CAT III weather conditions when the controlling RVR is less than RVR 1000. Additionally, these research programs show that all missed approaches resulting from failures in the fail-passive autoland system in CAT III weather conditions should be manually flown since automatic go-around capability is also lost in most aircraft if the fail-passive automatic landing system fails.

(2) *Fail-Operational Operations.* Fail-operational operations usually use an alert height (AH) instead of a DH (see AC 120-28). Fail-operational landing systems can be used for CAT IIIa operations. Fail-operational landing systems can also be used in CAT IIIb operations if these systems have at least a fail-passive rollout control capability. As the name implies, fail-operational systems remain operational even if failures occur. In other words, the loss of CAT III capability is not permitted when the aircraft is in the critical phases of approach and landing (below 100 feet AGL). Fail-operational systems are designed so that the system remains fully operational following any failure or combination of failures that are likely to occur after the aircraft passes 100 feet AGL. Fail-operational systems have been shown to have the capability to safely deliver the aircraft to the touchdown zone if the system is still fail-operational when the aircraft passes 100 feet AGL, even if failures occur in the system after passing this height. Therefore, there is no requirement to establish external visual reference before touchdown to confirm that the aircraft will land safely. The lowest minimums that may currently be approved for any AWTA operation by a U.S. operator is a controlling RVR of RVR 300 (90 meters). This restriction is based on the difficulties associated with aircraft movement on the taxiways, ramps, and other maneuvering areas on the airport and the on difficulties related to providing timely safety facilities and services (such as crash, fire, and rescue). In addition, fail-operational landing systems and fail-operational rollout control systems will be required if operating minimums less than RVR 300 are approved in the future.

## **615. ESTABLISHING CAT III OPERATING MINIMUMS.**

A. The operating minimums (DH and RVR or AH and RVR) for CAT III operations are usually determined by the tasks the pilot is required to perform to complete the landing and rollout (deceleration and air taxi for rotorcraft). Consideration must be given to the degree of precision and

integrity in flightpath control provided by the required electronic equipment and the enhanced seeing-conditions provided by the required visual aids. The RVR minimums are also higher if the pilot has to establish better seeing-conditions due to the complexity or difficulty of the tasks required to safely complete the landing (for example, factors related to the design or handling characteristics of a particular aircraft). As a general rule in CAT III operations, the minimum required seeing-condition (RVR) is higher than RVR 300 in situations where the pilot is required to perform special tasks during the operation. Some examples of these situations and special tasks are as follows:

- The pilot must establish visual reference before touchdown to confirm that the aircraft is being properly delivered to the runway (fail-passive CAT IIIa)
- The pilot must use external visual references to manually control the rollout (some CAT IIIa aircraft)
- Situations where the localizer (azimuth) cannot be used for rollout guidance (the course structure fails to meet CAT IIIb flight inspection criteria for rollout)
- Situations where the pre-threshold terrain profile at a particular runway creates abnormal but otherwise safe autoland performance in certain aircraft
- Situations where the aircraft has some other unique design feature or piloting task which requires enhanced seeing-conditions to safely perform a particular maneuver

B. Three basic levels of operating minimums have been established and are internationally agreed to for CAT III operations. These basic levels are: CAT IIIa (RVR 700), CAT IIIb (RVR 150), and CAT IIIc (RVR 0). Currently, the lowest CAT III minimums approved for any operator are RVR 250 (75 meters) for certain foreign flag operators conducting operations in Europe. The lowest CAT III minimum approved for any U. S. operator at any airport is RVR 300 (90 meters). For CAT III operations within the U.S., and for operations by U.S. operators at any airport, several additional levels of operating minimums are established within the basic CAT IIIa and CAT IIIb internationally recognized levels. The levels most commonly authorized for U.S. operators are RVR 1000, RVR 700, RVR 600, and RVR 300. Most

runways currently (1991) are approved for CAT III operations by U.S. operators are approved for operating minimums as low as RVR 600. Most U.S. airports are currently limited to RVR 600 operations due to limitations in the RVR reporting systems, inadequate CAT IIIb taxiway centerline lighting, and inadequate operational and ATC procedures to control and regulate aircraft and vehicular movement in RVR 300 seeing-conditions. A few airports in the U.S. and many airports in Europe, however, have all of the safety facilities and services necessary to safely conduct RVR 300 operations. Additionally, efforts are currently in progress to upgrade the safety facilities and services at many U.S. CAT III airports to permit RVR 300 operations.

(1) *RVR 1000 Level.* The RVR 1000 level is normally used for initial CAT IIIa operations for an aircraft new to an operator, unless that operator has received operational credit for using the “Special Process For Minimums Reduction” (see paragraph 625 D). Operators receiving this special operational credit may conduct initial CAT IIIa operations with RVR 700 minimums.

(2) *RVR 700 Level.* The RVR 700 level is the basic level for CAT IIIa operations. This level is the lowest minimum that can be authorized for fail-passive operations. RVR 700 is also the lowest minimum that can be authorized for operations with fail-operational landing systems which do not have a rollout control capability. Additionally, operations at runways which have ILS localizer restrictions (such as localizer unusable for rollout) are limited to the RVR 700 minimum.

(3) *RVR 600 Level.* The RVR 600 level is the current (1991) standard level for CAT III operations in the U.S. due to RVR reporting limitations, limitations to taxiway centerline lighting, and ground movement and control limitations. The RVR 600 level is also the lowest minimum that can be authorized at any airport for fail-operational landing systems which do not have at least a fail-passive rollout control system.

(4) *RVR 300 Level.* The RVR 300 level is the lowest minimum that can be currently authorized (1991) for operations by U.S. operators at any airport. This limitation is due to major limitations associated with the ground movement of aircraft and vehicles and the provision of timely crash, fire, and rescue facilities and services when operating in seeing-conditions less than those equivalent to RVR 300. Operations below RVR 300 are not foreseen until all of these limitations are resolved.

(5) *RVR 150 Level.* These operations are not

foreseen in the near future.

(6) *RVR 0 Level (CAT IIIc)*. Operations at this level are not foreseen until the aircraft and essential ground vehicles can be reliably maneuvered on the airport without relying on normal external visual references (for example, forward-looking infrared sensors).

#### **617. FUNCTIONAL REQUIREMENTS FOR VISUAL**

**REFERENCE.** The function of external visual reference is dependent upon the kind of CAT III operation being conducted. During operations with a DH (all fail-passive and certain unique fail-operational operations), sufficient external visual reference must be obtained to determine (before passing 50 feet AGL) that the flight control and guidance system is properly delivering the aircraft to the touchdown zone. These visual references are necessary for the pilot to determine that the aircraft is aligned with the touchdown zone and tracking so as to touchdown within the lateral confines of the runway. These visual references are also essential during operations with a DH to permit the pilot to detect situations where the aircraft would not touchdown within the longitudinal confines of the touchdown zone. For operators with an AH (fail-operational operations only), however, the external visual references that become available as the aircraft descends serve as advisory information to the pilot. During operations with an AH, the pilot is not required to establish visual reference before touchdown. The visual references that are available to the pilot during operations with an AH are used primarily for: assessing the performance of the rollout control system; continuing the rollout manually if a fail-passive rollout control system fails; and for taxiing the aircraft once a safe taxi speed is reached.

**619. DECISION REGION.** The “decision region” must be used in all CAT III operations. The decision region is that portion of the approach between 300 feet and 100 feet where the tracking performance of the flight guidance and control system is critically evaluated by the flightcrew to determine if the overall system performance is sufficient for the aircraft to continue the approach to touchdown. Since the visual scene normally expands as the aircraft descends due to geometric and slant range effects, the pilot must integrate the instrument and airborne system information with the visual cues as they become available.

A. For operations which use a DH, the pilot must arrive at a decision, before passing the DH, to either permit the flight guidance and control system to be used

to touchdown or to execute a missed approach. For a DH operation, the external visual information, the instrument information, and the airborne system information must be integrated in the decision region so the flightcrew can make a definitive decision no later than arrival at the DH. The decision to permit the flight guidance and control system to continue to direct the aircraft to touchdown must be based on an assessment that the airborne system is still fail-passive (fail-operational for CAT IIIb operations), the instrument information confirms that the tracking performance of the airborne system meets the decision region tolerances, and the external visual cues confirm that the aircraft will touchdown within the touchdown zone.

B. For operations with an AH, the pilot must also arrive at a decision, before passing the AH, to either permit the flight guidance and control system to be used to touchdown or to execute a missed approach. In direct contrast to operations with a DH, however, this decision must be based on an assessment that the airborne system is still fail-operational and the instrument information confirms that the tracking performance of the airborne system meets the decision region tolerances. External visual references are not required before touchdown in operations based on the AH concept.

C. Within the decision region, the flightcrew must be especially cognizant of the maximum permissible excursions of the raw ILS/MLS course and glidepath deviation from which a landing can be safely completed. The tracking performance criteria normally used for maximum displacements within the decision region are  $\pm 1/3$  dot localizer (azimuth) deviation and  $\pm 1/2$  dot glideslope (elevation) deviation with no sustained oscillations about the localizer or the glideslope. When the tracking performance is outside these parameters within the decision region during CAT III weather conditions, a go-around must be executed since the tracking performance is not sufficient to assure that the aircraft will safely complete a landing within the touchdown zone. Also, when operating within the decision region, the flightcrew must be especially alert for sudden, rapid oscillations of the localizer or glideslope deviations since these oscillations (the windshield wiper effect) may indicate that the ILS/MLS critical areas are not adequately protected. If any such oscillations occur below 100 feet AGL, a missed approach must be immediately executed unless adequate external visual cues are available to confirm that the aircraft is being properly delivered to the runway. A missed approach also must be immediately executed at any point in the approach before touchdown if the flightcrew detects or strongly suspects abnormal airborne or ground-based system performance.

## 621. RADIO ALTIMETER AND PRE-THRESHOLD TERRAIN.

A. The profile of the pre-threshold terrain is important to all ILS/MLS precision approach operations because the flight guidance and control systems in many aircraft use radio altimeter information to change the mode of operation and/or change the localizer or glideslope tracking sensitivity. At runways where the terrain beneath the approach flightpath is not approximately level, abnormal autopilot and/or flight director behavior may result from erroneous radio altimeter signals. Although these abnormalities may not be serious in CAT I or CAT II operations, irregularities in the pre-threshold terrain can have a major effect on the performance of the flight guidance and control systems required for CAT III operations. The profile of the pre-threshold terrain is also important to all ILS/MLS precision approach operations which use an AH or a DH based on radar altimeter information because the terrain can affect the value used for AH or DH. In certain extreme circumstances, the pre-threshold terrain profile can have such an adverse affect on determining the AH or DH from the radio altimeter, that the use of this information must be prohibited (that is, RA not authorized).

B. The operation of almost all CAT III landing systems is dependent on radio altimeter information during the latter stages of the landing. The flare profile, the rate of descent at touchdown, and the distance of the touchdown point from the threshold can be adversely affected by the profile of the terrain immediately before the landing threshold. The terrain which is most critical lies in an area approximately 200 feet on either side of the runway centerline extended from the threshold into the approach area to a distance of approximately 1000 feet before the landing threshold. There are four existing runways used for CAT III operation in the U.S. which have pre-threshold terrain profiles that can induce abnormal landing system performance in certain aircraft. This number is expected to increase as additional CAT III approaches are commissioned with the introduction of CAT III capable MLS facilities. The four CAT III capable runways in the U.S. which have abnormal pre-threshold terrain profiles are Cincinnati (CVG) runway 36, Pittsburgh (PIT) runway 10L, Minneapolis (MSP) runway 29L, and Seattle (SEA) runway 16R. A special operational test and evaluation program is required before approving any CAT III operations for any aircraft on these runways. This test program is essential to assure that CAT III operations can be safely conducted on these runways with a particular CAT III aircraft type (aircraft with similar flight characteristics and similar flight

guidance and control systems). This special test and evaluation must be accomplished in non-revenue service in accordance with Order 8400.8. All requests to conduct this evaluation must be forwarded through the RFSD to AFS-400. Inspectors shall not, under any circumstances, authorize any CAT III operations with any aircraft to these runways unless that particular CAT III type aircraft has been specifically evaluated in accordance with Order 8400.8 and specifically approved for that operation by AFS-400.

C. The pre-threshold terrain can also have an effect on AH or DH since the AH or DH used in CAT III operations is normally based on radio altimeter information. The AH used in CAT III operations is either AH 100 or AH 50. The DH used in CAT III operations is either DH 50 for fail-passive operations or a DH of 50 feet or less for fail-operational operations. Therefore, the terrain profile within the last 3000 feet, before the threshold, must be evaluated to establish the proper AH or DH and to ensure that the AH or DH can be accurately determined from radio altimeter information. The use of radio altimeter to determine AH or DH must be prohibited (that is, RA not authorized) in those situations where the AH or DH cannot be accurately and reliably determined from radio altimeter information.

(1) A few CAT II runways currently (1991) have restrictions (that is, RA not authorized) due to the pre-threshold terrain profile which prohibits the use of radio altimeter information to determine the CAT II DH. Standard CAT II operations (DH 100 and RVR 1200) can still be conducted by using the inner marker to determine arrival at the DH. Although the radio altimeter cannot be used to accurately and reliably determine arrival at the CAT II DH (HAT 100), it may still be possible to safely conduct CAT III operations to these runways if the pre-threshold terrain does not adversely affect the performance of the CAT III landing system. CAT III operations may be conducted, however, to these runways when the CAT III AH or DH can be accurately and reliably determined by radio altimeter information or when an alternative means can be used to identify arrival at the AH or DH. Therefore, CAT III operations at all runways which have CAT II radio altimeter restrictions require a special evaluation to determine that the CAT III AH or DH can be accurately and reliably established for that runway. CAT III operations shall not be approved to these runways and CAT III instrument approach procedures shall not be established for these runways until specific CAT III approval is received from AFS-400 and that runway is approved for CAT III operations in accordance with Order 8400.8

(2) Since the inner marker is normally beneath the CAT II DH (HAT 100), fail-operational operations which are authorized to use AH 100 can use the inner marker to define AH (in lieu of the radio altimeter) at runways where the use of radio altimeter information is not authorized. The CAT III OpSpecs must contain a specific limitation that the inner marker must be used to define AH at that runway. Furthermore, fail-passive operations and those fail-operational operations which require the use of a DH cannot be conducted at such a runway unless radio altimeter information can be used to accurately and reliably define the CAT III DH being used.

(3) Since all DH's used in CAT III operations must be 50 feet or less, the inner marker cannot be used to define the CAT III DH. It may be possible, however, to use radio altimeter information to accurately and reliably establish the CAT III DH even though radio altimeter information cannot be used to define the CAT II DH (HAT 100). Since DH 50 is located very near the runway threshold and a DH less than DH 50 occurs over the runway, the terrain profile within these areas is generally adequate for CAT III radio altimeter-based DH's. The pre-threshold terrain in unusual circumstances, however, can adversely affect the use of radio altimeter information to define a CAT III DH and CAT III operations based on a DH, and therefore must be prohibited in those cases.

D. The operating rules prohibit the use of an autopilot or a HUD to touchdown in any operation unless the operator is specifically authorized to conduct autoland operations with that aircraft in OpSpecs paragraph C61 or H110, as appropriate, or C62 or H111 for HUD systems. It is the operator's responsibility to determine that the pre-threshold terrain profile and ILS/MLS course structures are adequate for operations at any runway where it conducts landing operations using these systems. Therefore, all operators approved to use autoland or HUD-equipped aircraft should be encouraged to routinely use these systems at suitably equipped runways during operations in VFR and in CAT I IFR conditions. They should also routinely monitor equipment performance.

**623. TYPES OF ILS SYSTEMS.** CAT III operations conducted by U.S. operators at U.S. runways are conducted on two different types of ILS systems. These two types of ILS systems are specified as Type II and Type III ILS systems (see Order 8400.8 and Order 6750.24).

A. The ILS systems that were originally installed in

the U.S. to support CAT III operations met all of the ICAO requirements and recommendations for those ILS facilities intended to support CAT III operations. The description of these facilities is specified in ICAO Annex 10 as "Facility Performance CAT III systems". Eleven of these ILS facilities were commissioned in the U.S. for CAT III operations. The U.S. no longer uses the term "Facility Performance Category III Systems" to describe the configuration of ILS systems, but has replaced it with a classification system based on "type". Facility Performance CAT III Systems are included in the U.S. Type III designation system. The primary purpose for transitioning to a different classification terminology was to provide a clear distinction between the ILS system "black box" configuration, the performance of the ILS, and the kinds of operations that could be conducted on a particular kind of ILS. The "type" designator only specifies the "black box" configuration of the ILS (for example, one active localizer transmitter and one "hot" standby transmitter).

B. The ILS systems originally installed in the U.S. to support CAT II operations exceeded the ICAO requirements for Facility Performance CAT II Systems. These systems are now known in the U.S. as Type II, ILS systems and most of these systems are also known as AN/GRN 27 systems. The most significant differences from an operational perspective between the Type II systems and the Type III systems are related to their "black box" configurations. For example, although the Type II system also had redundant localizer transmitters, it used a "cold" standby transmitter instead of a "hot" standby transmitter. The use of a cold standby transmitter resulted in a short, loss-of-signal period when the active transmitter failed and the system automatically switched power to the cold transmitter. The Type II system also used dual far-field monitors to detect localizer out-of-tolerance conditions instead of the triple monitors used in the Type III system.

C. As U.S. experience in CAT II and CAT III operations was gained, it was recognized that the performance, integrity, and continuity-of-service provided by many of the Type II, ILS facilities approached the quality necessary for CAT III operations. In 1976, many of the Type II localizer systems were modified to shorten the transmitter change-over time to reduce the total loss-of-signal and out-of-tolerance time to less than 2 seconds. All CAT III-capable aircraft were evaluated during certification testing to assure that this 2-second signal out-of-tolerance condition would not adversely affect any CAT III operation. In 1978, CAT IIIa operations were authorized on 26 Type II, ILS systems (31 Type II ILS systems were being used in 1989). All operations on these facilities were initially limited to CAT IIIa operations.

CAT III operations using Type II, ILS facilities are currently authorized in accordance with Order 8400.8 and Order 6750.24. Part 97 CAT III approach procedures were not initially established (published) for the Type II facilities approved for CAT III operations since these facilities did not fully comply with all of the ICAO guidance material for Facility Performance CAT III systems. The only Part 97 approach procedures that were initially published for these facilities were the standard CAT II approach procedures. Therefore, CAT III operations at these facilities were initially authorized OpSpecs and the operators had to use special tailored approach plates when conducting CAT III operations at these facilities. As a result, foreign flag operators were not authorized to conduct CAT III operations at these facilities unless the State of the operator specifically approved them to conduct CAT III operations on U.S. Type II facilities.

D. The final steps to fully upgrade Type II facilities to full CAT IIIB began in 1985 with the establishment of a new performance classification system for precision approach systems in ICAO Annex 10. This new ICAO classification system clearly recognized that the overall performance of a particular facility was much more germane than its “black box” configuration. This significant change in international criteria also enabled the U.S. Type II facilities to fully comply with ICAO guidelines and therefore enabled the establishment of Part 97, CAT III approach procedures for these facilities. These standards are reflected in Order 6750.24 and are currently used in the U.S. to classify the level of performance (integrity, continuity-of-service, and course structure) provided by a particular ILS/MLS facility. The classification system in Order 6750.24 specifies the integrity level provided by the facility (I, II, or III); the last point along the runway where the localizer course structure meets flight inspection criteria (Point C, D, or E); and the continuity-of-service (reliability) level for the facility (1, 2, 3, or 4). Therefore, a facility classified as IIIE4 meets all requirements for CAT IIIB operations with conventional autoland systems. This particular classification means that the facility has CAT IIIB integrity, has been flight inspected to CAT IIIB tolerances through rollout, and that it provides CAT IIIB continuity-of-service. In the future it might be possible, however, to conduct CAT IIIB operations using a facility which is classified as a ID2, provided the airborne equipment was designed so that the aircraft could be safely landed independent of any ground-based equipment, once the aircraft has been established on the ILS/MLS final approach course. An example of such airborne equipment would be a properly designed millimeter wave radar and

forward-looking infrared system.

E. The program to upgrade all Type II facilities that were used for CAT III operations to support full CAT IIIB operations was initiated in 1985 in conjunction with the amendment of Order 6750.24. This upgrading effort implemented the new ICAO classification system and resulted in several changes to the configuration and performance of the Type II systems. The most significant changes included: the installation of a remote ILS status indicator to immediately alert the ATC facility when the ILS system was performing out-of-tolerance; the establishment of a requirement to confirm on a daily basis that the localizer far-field monitors were functioning properly; and, the adjustment of the localizer course alignment to full CAT IIIB tolerances ( $\pm 10$  feet of the actual runway centerline). These changes brought the Type II facilities into full compliance with all national and international criteria for CAT IIIB operations. These changes also enabled the establishment of Part 97, CAT IIIB instrument approach procedures for these facilities when that particular facility was reclassified in accordance with the new ICAO guidelines and Order 6750.24 criteria. The publication of the Part 97, CAT III instrument approach procedure also permitted foreign flag operators to use these facilities without requiring special approval from the State of the operator.

F. AFS-400 is the Flight Standards Service approval authority for the use of any ILS or MLS facility at any airport or runway for CAT III operations. All ILS and MLS facilities approved for use by U.S. operators to conduct CAT III operations are specified in Order 8400.8 (as amended). Inspectors shall not approve any CAT III operations at any airport or to any runway that is not specifically approved for the appropriate CAT III minimums for a particular CAT III type aircraft, as listed in Order 8400.8.

**625. APPROVAL OF CAT III OPERATING MINIMUMS.** CAT III operating minimums are established in accordance with the criteria in AC 120-28, the U.S. Terps, and this handbook.

A. With each aircraft that is new to an operator, the operator's initial CAT III operations are usually restricted at all airports for at least 6 months until the operator acceptably demonstrates its ability to satisfactorily maintain that aircraft for the various levels of CAT III operations. The actual process for introducing an aircraft that is new an operator, obtaining reductions in operating minimums for that aircraft, and the number of steps required to achieve the lowest possible operating minimums for that particular



operator and aircraft, depend on the operating policies and operational choices made by the operator. Although several alternatives will be discussed in subsequent subparagraphs, all alternatives must comply with the general Flight Standards policy for reductions to operating minimums.

B. The Flight Standards policy for reductions to minimums requires that each operator of each CAT III type of aircraft (aircraft with similar flight characteristics and similar flight guidance and control systems) must follow a certain progression from CAT I operating minimums through CAT II operating minimums before achieving CAT III minimums. Furthermore, each operator of each CAT III type of aircraft must progress through CAT IIIa operating minimums to achieve CAT IIIb minimums. The principle purpose of this progression requirement is to validate the maintenance program for the various categories of operation. At least 6 months of operation at each step of this reduction of minimums process is necessary to properly validate the effectiveness of the AWTa operations maintenance program for that step.

C. In accordance with the normal approval criteria for CAT II operations in AC 120-29 and the CAT III criteria in AC 120-28, the reduction process would require 6 months of operation at DH 150/RVR 1600 to validate the maintenance program before receiving approval of operations at DH 100/RVR 1200.

(1) *Normal CAT IIIa Reduction.* When operating minimums of DH 100/RVR 1200 are approved, the operator can apply for CAT IIIa operations and receive approval for operations with minimums of RVR 1000. After 6 months of successfully maintaining the aircraft to CAT IIIa standards, the operator could be authorized standard CAT IIIa minimums of RVR 700.

(2) *Normal CAT IIIb Reduction.* After receiving CAT IIIa approval, the operator could apply for a CAT IIIb authorization if the aircraft was suitably equipped. The operator could then be authorized minimums as low as RVR 300 6 months later if the CAT IIIb maintenance program was successfully validated.

(3) *Normal Reduction Schedule.* Under the normal approval process, the lowest possible minimums for a CAT IIIb capable aircraft (RVR 300) would be approved at least 18 months after the initial application for CAT II operations. Although this lengthy process is necessary in certain circumstances, the operator can significantly reduce the time required to achieve the

lowest minimums by structuring its operations and maintenance validation programs to receive operational credit for use of the special process for minimums reductions.

D. *Special Process for Minimums Reductions.* Since airborne equipment that is type design approved for CAT III operations has special design features which increase the safety of operations in restricted seeing-conditions, it is possible for an operator to receive special operational credit for the use of these enhanced systems. Special operational credit is obtained by the FAA initially authorizing CAT II operations with operating minimums of DH 100 and RVR 1200 with special restrictions specified in the OpSpecs. The maintenance program is then validated in accordance with these special requirements.

(1) *Basic Approach.* The basic approach used in this special approval process is to structure the operational requirements and the data collection requirements so that all approaches used to validate the maintenance program are conducted using the complete CAT IIIa or CAT IIIb airborne system, as appropriate. This approach permits the data collected during the CAT II validation to fulfill both the CAT II and the CAT IIIa requirements, and thereby bypassing the need for the RVR 1600 and RVR 1000 minimums reduction steps. For an operator to receive this credit, however, it is essential that the aircraft be operated to full CAT III standards throughout the validation process and that the CAT II OpSpecs contain a restriction to operate the aircraft in the "fail-passive" or "fail-operational" configuration, as appropriate, for the first 6 months of CAT II operation. Further reductions in operating minimums are obtained in accordance with the guidance and direction in the subparagraphs that follow.

(2) *Fail-Passive Systems.* For fail-passive systems, the special reduction process would require 6 months of operation at DH 100 and RVR 1200 with a restriction that requires the operator to operate in the fail-passive mode to touchdown. After successfully completing this validation, the CAT II restriction to operate in the fail-passive mode can then be removed and the operator authorized for CAT IIIa minimums of DH 50 and RVR 700. This means that the lowest minimums for these aircraft could be achieved 6 months after the initial application for CAT II approval.

(3) *Fail-Operational Systems.* For fail-operational systems, the first 6 months of operation must be conducted at DH 100 and RVR 1200 with a restriction to operate in the fail-passive or fail-operational mode through touchdown and rollout. After successful completion of this validation,

the CAT II restriction to operate in the fail-passive or fail-operational mode will be removed and the operator will be authorized for CAT IIIa minimums of RVR 700 with a restriction to operate in the fail-operational mode through touchdown and rollout for 6 additional months. After successful completion of this second validation period, the operator would be authorized to conduct CAT IIIb operations with the lowest possible minimums. The lowest possible minimums would be RVR 300, unless the aircraft is restricted to higher minimums by the CAT IIIb type design approval. The CAT IIIa restriction to operate in the fail-operational mode will be removed for aircraft smaller than the DC10/L1011 if the operator requests approval to conduct fail-passive CAT IIIa operations. This means that the lowest minimums for these aircraft could be achieved 12 months after the initial application for CAT II operations is approved.

**627. STANDARD CAT III OPERATIONS.** Standard CAT III operating minimums must be based on a “building block” approach which uses the foundations provided by the special aeronautical knowledge, experience, skills, qualifications, training, and the special airborne and ground-based equipment specified in AC 120-29 for CAT I and CAT II operations. The assumptions and criteria used in aircraft certification and CAT III instrument approach procedure design must be compatible with the operational concepts in this handbook. These requirements must also ensure that flightcrews and aircraft which meet the requirements of this handbook and AC 120-28, can be used to safely conduct CAT III operations with standard CAT III minimums. Any special equipment or procedures necessary to achieve this objective must be specified in the airworthiness certification basis of the aircraft (type certificate or supplemental type certificate) and/or the FAA-approved aircraft flight manual. Aircraft which cannot be safely operated with standard CAT III operating minimums using flightcrews which meet the minimum requirements of this handbook and AC 120-28, shall not be certificated or otherwise approved for CAT III AWTAs. The OpSpecs establish the lowest operating minimums which can be used in any CAT III operation even if the instrument approach procedure specifies minimums lower than these values. Special airborne equipment, special ground-based equipment, and special flightcrew training are required for CAT III operations. These requirements are specified in this handbook, AC 120-28, and the FAA-approved aircraft flight manuals.

*A. Standard CAT III Operating Minimums.* Standard CAT IIIa operating minimums are DH 50 and RVR 700 for fail-passive systems and either AH 100 or AH 50 and

RVR 700 for fail-operational systems. Standard CAT IIIb minimums for U.S. operators and U.S. airports are either AH 100 or AH 50 and RVR 300. CAT III operations at most U.S. airports, however, are currently (1991) limited to RVR 600 until the safety facilities and services at these airports are enhanced to support RVR 300 operations. The AH used in fail-operational operations is normally based on radio altimeter information and must be based on either the inner marker or radio altimeter information. The CAT III DH used in all fail-passive operations and some unique fail-operational operations must be based on radio altimeter information. Barometric altimeter information is not an acceptable means of establishing AH or DH in any CAT III operation.

*B. Higher-Than-Standard CAT III Operating Minimums.* Higher-than-standard CAT III minimums are used in certain special cases. These minimums are usually applied as interim minimums for the first 6 months of CAT IIIa and CAT IIIb operations with an aircraft new to an operator until that operator’s maintenance program for that aircraft is validated for standard minimums (see paragraph 625). Higher-than-standard minimums are also applied in special situations where RVR reporting system limitations, pre-threshold terrain limitations, or unique design features in a particular aircraft which preclude the use of standard CAT III minimums (see paragraph 621).

*C. Operational Approval Basis.* All standard CAT III operations are approved by the issuance of OpSpecs which authorize the conduct of CAT III instrument procedures at specified airports. The basis for the approval of all CAT III airplane operations is AC 120-28.

*D. CAT III Flight Guidance and Control Systems.* Standard CAT III operations are based on the use of special airborne and ground-based equipment which provide increased capability, redundancy, integrity, and continuity-of-service. The overall performance of the CAT III airborne equipment must be superior to the equipment required for CAT I and CAT II operations. The very limited seeing-conditions available in CAT III operations and the piloting limitations associated with operating in these conditions do not permit the pilot to use visual cues to manually control and maneuver the aircraft during the final stages of approach, flare, and landing (deceleration and air taxi for rotorcraft). Therefore, the flightcrew must rely on the airborne and ground-based equipment to safely deliver the aircraft to the touchdown zone (see paragraph 613).

(1) *Generic Design Philosophy.* The airborne system and the ground-based system must be able to detect

all potential failures which could significantly disturb the flightpath of the aircraft. The ability of these systems to detect such failures requires special design practices and system redundancy. The airborne systems require at least two independent flight guidance and control computations ("dual channel") for detecting significant errors. The airborne system detects errors by comparing the results of these computations. If the results of the calculations are not equivalent, the system knows that an error has occurred. Autoland systems are designed to prevent the autopilot from making control inputs which would significantly disturb the flightpath when these errors occur. Autoland systems also provide the flightcrew with an immediate aural and visual warning when these failures are detected when an immediate crew action is required (such as initiating a go-around). Heads-up display (HUD) systems must also detect significant failures and provide similar warnings when failures occur. Since the pilot is manually maneuvering the aircraft in HUD operations, HUD systems are generally designed to prevent undesired control inputs as a result of failures by denying the pilot any further access to the erroneous information and by clearly annunciating the failure.

(2) *Fail-Passive Design Philosophy.* Fail-passive systems usually use only two independent sets of flight guidance and control computations ("dual channel"). If an error is detected during the comparison process, fail-passive systems cannot determine which computation is erroneous since only two solutions are available. Since fail-passive systems cannot determine which control computation is incorrect, the system fails (disconnects for autoland systems) and immediately provides an aural and visual warning. This warning notifies the flightcrew that immediate action is required (for example, initiating a go-around). Fail-passive capability is typically provided by either two autopilots (two "black boxes") each of which has a single flight control computation capability ("single channel") or one autopilot (one "black box") which provides two independent flight control computations ("dual channel"). The dual, single-channel systems are typically used by Boeing aircraft and the single, dual-channel systems are typically used by Airbus, Douglas, Flight Dynamics (HUD), and Lockheed.

(3) *Fail-Operational Design Philosophy.* Fail-operational systems must use at least three independent sets of flight guidance and control computations ("triple channel") to detect errors and determine which two calculations remain valid. If an error is detected during the comparison process, fail-operational systems remain fully operational by comparing all of the calculations to determine which computation is erroneous. The

calculation which disagrees with the rest of the computations is disregarded by the system and the commands from that computation channel are disabled (the bad calculation is voted out by majority rule). The fail-operational system remains fully operational by continuing to use the remaining computations to provide flight guidance and control. Since the system remains fully operational when failures occur, there is no need for immediate crew action or intervention to safely complete the landing. The systems which remain functional following these failures provide adequate redundancy and integrity to safely complete the landing. Fail-operational capability is typically provided by either three autopilots (three "black boxes") each of which has an independent flight control computation capability ("single channel") or two autopilots (two "black boxes") each of which has a dual independent computation capability ("dual channel"). The triple, single-channel systems ("triple-single") are typically used by Boeing aircraft and the dual-channel systems ("dual-dual") are typically used by Airbus, Douglas, and Lockheed.

E. *Airworthiness of CAT III Airborne Equipment.* Currently (1991), there is only one acceptable means for demonstrating that the airborne equipment is airworthy for CAT III operations. This means of approval is CAT III type design approval which is normally reflected in the FAA-approved aircraft flight manual. Inspectors shall not approve CAT III operations with any aircraft for any operator unless the operator presents written evidence of CAT III type design approval for the particular aircraft.

F. *Validation of the CAT III Maintenance Program.* The reliability required in the airborne system to conduct CAT III operations is achieved by special design requirements and special maintenance programs. The extensive, special maintenance program necessary for CAT III operations is usually the largest economic factor affecting an operator's decision to conduct these operations. If the operator's aircraft are equipped with standard CAT III equipment, all CAT III operations with aircraft that are new to that operator are usually initially restricted (for 6 months) to higher-than-standard CAT IIIa operating minimums until the operator successfully validates its maintenance program in accordance with AC 120-28. It may be possible for the operator to be initially authorized for standard CAT IIIa minimums (RVR 700), however, if the operator receives operational credit for using the special process for minimums reductions (see subparagraph 625D).

G. *CAT III Airports and Runways (U.S. Operators).* All CAT III operations are restricted to airports and runways which meet the special safety requirements

necessary for CAT III operations. All airports and runways approved for CAT III operations by U.S. operators are specified in FAA Order 8400.8. Even when a particular runway is approved for CAT III operations, an operator shall not be authorized to conduct CAT III operations until all requirements of this handbook and FAA Order 8400.8 are met, and the particular CAT III operation is authorized in the operator's OpSpecs for the particular aircraft.

**629. SPECIAL CAT III OPERATIONS.** Special CAT III operations are those operations which require special airborne equipment, special ground-based equipment, or special procedures to conduct CAT III operations. Special CAT III operations include those operations which are granted operational credit for the use of special airborne capabilities, such as HUD or millimeter wave radar and infrared systems, as well as operations which require the use of special equipment and/or performance capabilities to conduct standard CAT III operations. Special CAT III operations also include those operations which use special ground-based equipment, special aircraft performance, and special procedures to conduct CAT III operations which cannot be safely conducted by conventional aircraft using standard airborne CAT III equipment and procedures (for example, steep-angle CAT III, MLS approaches). All requests to conduct a special CAT III operation must be forwarded to AFS-400 through the RFSD. AFS-400 will evaluate each CAT III operation on a case-by-case basis and will provide additional guidance and direction for the evaluation and approval of these requests.

**631. CAT III TERMINAL INSTRUMENT APPROACH PROCEDURES (U.S.)** All CAT III AWTA operations conducted in the U.S. must be conducted in accordance with the operator's CAT III OpSpecs. Part 97 instrument approach procedures have been published for some of the U.S. runways approved for CAT III operations. The primary means for approving these operations, however, is through the issuance of OpSpecs which specify the runways and minimums authorized for each aircraft used by a particular operator. This means that the operator can conduct CAT III operations to runways in the U.S. which do not have CAT III, Part 97 approach procedures. For example, this includes CAT III operations on Type II facilities approved for CAT III operations with that aircraft in accordance with FAA Order 8400.8, even if the lowest published Part 97 instrument approach procedure is a CAT II procedure.

*A. Procedures Authorized in the U.S.* Paragraphs C60 and H109 of the OpSpecs contain specifications for the

CAT III instrument approach procedures, runways, operating minimums, limitations, and aircraft authorized for CAT III operations for a particular operator. These paragraphs also specify the CAT III airborne equipment, RVR equipment, pilot qualification, and missed approach requirements which apply to a particular operator's CAT III operation. If the flightcrew is properly qualified and the aircraft is properly equipped and maintained, an operator can, in general, be authorized to conduct CAT III AWTA operations to any runway approved for CAT III operations in Order 8400.8. The exception to this are those runways specified as restricted CAT III runways. The pre-threshold terrain at restricted CAT III runways requires additional analysis and flight testing before CAT III operations can be approved for these runways.

*B. CAT III Approach and Landing Minimums.* AC 120-28 and this handbook establish the lowest approach and landing minimums that can be authorized, under any circumstances, for CAT III operations. The lowest minimums for each kind of CAT III operation for a particular operator are specified in paragraphs C60 and H109 of the OpSpecs, as appropriate. FAA inspectors shall not authorize an operator to use minimums lower than these values.

**633. FOREIGN CAT III INSTRUMENT APPROACH PROCEDURES.** All CAT III operations by U.S. operators at foreign airports must be authorized in accordance with the guidance and direction in this handbook. All foreign runways approved for CAT III operations by U.S. operators must also meet the requirements of this handbook, Order 8400.8, and Order 8260.31.

*A. Foreign Equivalence.* Although it is recognized that the CAT III ground-based systems and procedures at foreign airports may not be in exact accordance with U.S. standards, it is critical for the foreign airports to provide the information and functions which are necessary for CAT III operations in a manner consistent with the intent of U.S. CAT III standards.

(1) *General.* The FAA region which has surveillance responsibility for a particular foreign airport has the responsibility for evaluating any runway at that airport which supports CAT III operations. The controlling region is also responsible for evaluating these CAT III runways in accordance with Order 8400.8 and Order 8260.31 and for recommending approval or disapproval of CAT III operations to those runways. The controlling region's recommendations must be forwarded to AFS-400 for further evaluation and final approval or disapproval. Foreign runways which have been determined to be

equivalent to U.S. CAT III standards and approval for CAT III operators are identified in the list of runways in Order 8400.8. Operators desiring CAT III approvals at foreign airports which are not on this approved list should submit a request for evaluation and approval through their POI and the RFSD to AFS-400. AFS-400 will request that an evaluation be conducted by the controlling region.

(2) *Determining Equivalence.* The major factor which is considered by AFS-400 and the controlling region in approving foreign runways in accordance with Order 8400.8 and Order 8260.31 for CAT III operations by U.S. operators, is the degree of equivalence with U.S. CAT III standards. This determination evaluates the equivalence of:

- High-intensity approach lights
- High-intensity runway edge lights
- Touchdown zone and centerline lights
- Taxiway edge lights
- High-intensity, taxiway centerline lights
- Runway markings
- The quality and integrity of the approach and landing ground-based guidance system
- The RVR reporting capabilities and procedures
- ILS/MLS critical areas, including signs and markings
- Obstacle clearance protection in the approach and missed approach, including the obstacle-free zone
- Airport surface traffic control
- Terminal area air traffic control
- Procedures for regulating the ground movement of aircraft and vehicles during CAT III operations

**B. Authorizing Foreign CAT III Runways.** All CAT III operations conducted in foreign countries must be conducted in accordance with the operator's CAT III OpSpecs. The only means of approving these operations

is through the issuance of OpSpecs which specify the foreign runways and minimums authorized for each aircraft used by the operator. Paragraphs C60 and H109 of the OpSpecs specify the CAT III instrument approach procedures, runways, operating minimums, limitations, and aircraft authorized for CAT III operations for a particular operator. These paragraphs also specify the CAT III airborne equipment, RVR equipment, pilot qualification, and missed approach requirements which apply to the operator's CAT III operation. If the flightcrew is properly qualified and the aircraft is properly equipped and maintained, an operator can, in general, be authorized to conduct CAT III AWTA operations to any foreign runway approved for CAT III operations in Order 8400.8. The exception to this are those runways specified as restricted CAT III runways. The criteria in AC 120-28 and this handbook establish the lowest approach and landing minimums that can be authorized, under any circumstances, for CAT III operations. The lowest minimums for each kind of CAT III operation for a particular operator are specified in paragraphs C60 and H109 of the OpSpecs, as appropriate. FAA inspectors shall not authorize an operator to use minimums lower than these values. Additionally, inspectors shall not authorize the use of CAT III minimums for any foreign runway unless the provision of this handbook, Order 8400.8 and Order 8260.31 are met.

**635. FOREIGN FLAG CAT III OPERATIONS IN THE U.S.** Although it is recognized that the airborne equipment, pilot training, and pilot qualification standards required by foreign civil aviation authorities for CAT III operations may not be exactly in accordance with U.S. standards, it is essential for foreign flag operators to conduct CAT III operations in the U.S. in a manner consistent with the intent of U.S. CAT III standards. When operating in the U.S., a particular foreign flag operator's foreign civil aviation authority (State of that operator) has the primary responsibility for determining that the operator complies with the special requirements it specifies for CAT III operations at any airport. The State of the operator also has the primary responsibility for authorizing and/or restricting operating minimums for any operation by that foreign flag operator. Therefore, the FAA inspector's primary responsibility related to foreign flag CAT III operations is to ensure that these operations are conducted in the U.S. in a manner compatible with the intent of U.S. standards and procedures and the authorizations and restrictions imposed by that particular operator's State.

**A. General Principles.** When evaluating a request by a foreign flag operator to conduct CAT III operations within the U.S., the inspector must use special criteria which accommodates several general principles associated

with the unique nature of these operations and the responsibilities of the State of the operator. These general principles include at least the following Flight Standards policies:

(1) A foreign flag operator will not be authorized to conduct CAT III operations in the U.S. unless that operator is authorized by its foreign aviation authority to conduct CAT III operations.

(2) A foreign flag operator will not be authorized for CAT III operating minimums in the U.S. that are lower than the CAT III operating minimums authorized by its foreign aviation authority for CAT III operations.

(3) A foreign flag operator will not be authorized for CAT III operating minimums in the U.S. that are lower than the lowest minimums authorized to a comparably equipped U.S. operator.

(4) A foreign flag operator must provide documentation from its foreign aviation authority confirming that the State of the operator has determined that the operator's CAT III program is equivalent to the program required by AC 120-28 for U.S. operators.

(5) The confirmation by the State of the operator that the foreign flag operator is authorized for CAT III operations with a particular aircraft type and that the operators's flight operations and maintenance programs are equivalent to U.S. standards normally satisfies one of the inspector's responsibilities. This responsibility is to ensure that the operator's aircraft are properly equipped and maintained and that the flightcrews are properly trained and qualified for CAT III operations.

(6) All CAT III operations by foreign flag operators in the U.S. must be conducted in accordance with a Part 97, CAT III instrument approach procedure unless that operator's foreign aviation authority specifically authorizes that operator to conduct CAT III operations at those U.S. Type II, ILS facilities which are approved for CAT III operations in accordance with FAA Order 8400.8. If the foreign flag operator is not authorized by its foreign authority to conduct CAT III operations on CAT III- approved U.S. Type II, ILS facilities, that operator shall not be authorized CAT III operations at any airport which does not have a published Part 97, CAT III instrument approach procedure. If a particular foreign flag operator is specifically authorized by its foreign aviation authority to conduct CAT III operations on U.S. Type II facilities which are approved for CAT III operations, that operator can be authorized to

conduct CAT III operations to any runway approved for unrestricted CAT III operations in Order 8400.8. Requests by foreign flag operators to conduct CAT III operations to restricted CAT III runways will be evaluated and approved by AFS-400 on a case-by-case basis. All foreign flag requests to conduct CAT III operations on these restricted runways must be forwarded to AFS-400 through the RFSD.

*B. CAT III Approach and Landing Minimums (Foreign Flag).* AC 120-28 and this handbook establish the lowest approach and landing minimums which can be authorized, under any circumstances, for foreign flag CAT III operations in the U.S. These minimums are equivalent to the minimums authorized for a comparably equipped U.S. operator. The CAT III operating minimums authorized for a particular foreign flag operator are specified in paragraph C60 (H109 for rotorcraft) of the OpSpecs, and in a manner similar to minimums specified for U.S. operators. Inspectors shall not authorize a foreign flag operator to use CAT III minimums lower than the values authorized by the State of the operator. The airborne equipment required by AC 120-28 and any additional equipment required by the State of the operator for CAT III operations must also be specified in this paragraph in the OpSpecs.

(1) *Standard CAT III Operating Minimums.* If a foreign flag operator has at least 6 months of satisfactory experience conducting CAT III operations with a particular aircraft type, and at least 6 months of satisfactory experience conducting autoland or HUD operations at an appropriate U.S. facility, that operator can be authorized to conduct standard CAT IIIa operations with minimums of RVR 700 or CAT IIIb minimums, and if suitably equipped, with minimums as low as RVR 300.

(2) *Higher-Than-Standard CAT III Operating Minimums.* If a foreign flag operator does not have at least 6 months of satisfactory experience in conducting CAT III operations (in any country) and at least 6 months of autoland or HUD experience using U.S. facilities, that operator must be restricted to higher-than-standard CAT IIIa operating minimums (RVR 1000) until it completes a 6-month demonstration program. This demonstration program is equivalent to the program required for U.S. operators except that the foreign flag operator does not have to submit the documentation required in AC 120-28 if the State of the operator confirms that the demonstration was satisfactorily completed. Following successful completion of this demonstration program, the operator can be authorized for standard CAT IIIa minimums and, if suitably equipped, for standard CAT IIIb minimums (see AC 120-28 for further guidance).

**637. CAT III EVALUATION AND APPROVAL PROCESS.** The approval process for CAT III AWTA operations is generally the same as the generic approval process for approval or acceptance described in volume 1, chapter 4, section 6 of this handbook. More detailed general evaluation and approval criteria for AWTA operations are provided in section 4, paragraphs 551 through 563 of this chapter. The CAT III approval process also closely parallels the CAT II process. The discussion in this paragraph contains specific criteria and direction related to the evaluation and approval of CAT III AWTA operations.

A. *General.* Conceptually, CAT III AWTA operations are based on the “building block” approach using the foundation provided by the CAT I and CAT II building blocks. Therefore, the discussion to follow includes only those factors that are unique to CAT III operations. When evaluating an operator’s request to conduct CAT III operations, the inspector must evaluate the factors addressed in this paragraph and make a judgement related to the operator’s ability and competence to conduct these operations. The inspector shall ensure that the operator specifies the conditions necessary to safely and competently conduct the proposed operations, and that those conditions ensure that the following criteria are met:

- Operations are restricted to those aircraft which are properly equipped and airworthy for the CAT III operation being conducted
- Compliance with the regulatory requirements for those operations
- Compliance with the CAT III requirements of Part C (Part H if appropriate) of the OpSpecs
- Compliance with the CAT III requirements of this handbook
- Compliance with the CAT III criteria of AC 120-28
- Accepted, safe CAT III operating practices are provided
- The use of the stabilized approach concept in all CAT III operations is required (see section 4 of this chapter)
- CAT III operations are restricted to those pilots who are properly trained, experienced, qualified, and proficient for CAT III operations

- CAT III operations are restricted to those airports and runways which are approved for CAT III operations in Order 8400.8
- CAT III operations are restricted and authorized at foreign airports and runways in accordance with Order 8400.8 and Order 8260.31
- Fail-passive CAT III operations are restricted to those aircraft approved for these operations by AFS-40CAT IIIb operations are restricted to those aircraft which meet the CAT IIIb requirements of AC 120-28
- CAT IIIb RVR 300 operations are restricted to those airports specifically approved for these operations in Order 8400.
- CAT III operations at runways designated as restricted CAT III runways in Order 8400.8 are restricted to only those aircraft approved for these operations in that order

B. *Airport/Runway and Ground-Based Equipment Requirements.*

(1) *General.* The adequacy and suitability of the airport/runway and the ground-based electronic and visual aids for the type of aircraft and the kind of operation being conducted are an integral part of evaluating and approving CAT III AWTA operations.

(2) *Ground-Based Visual Aids.* One of the primary factors in achieving CAT III operations is related to ground-based lighting aids. All CAT III operations are based on the use of: serviceable high-intensity approach lighting systems (Order 6850.21); high-intensity runway edge lights (AC 150.5340-24); high-intensity touchdown zone lights (AC 150.5340-4); high-intensity runway centerline lights (AC 150.5340-4); and precision runway markings (AC 150.5349-1). Sequenced flashing lights must be installed but do not have to be operational for CAT III operations in the U.S. ICAO Annex 14, however, does not require sequenced flashing lights for CAT III operations. CAT III operations can be conducted at foreign airports which do not have sequenced flashing lights provided that the FAA controlling region has determined that the approach lighting system provides adequate guidance and the runway is approved for CAT III operations in Order 8400.8. For CAT IIIb operations with operating minimums

below RVR 600, high-intensity taxiway centerline lights are required for the taxi routings used in CAT IIIB weather conditions (see AC 150.5340-19).

(3) *ILS/MLS Performance Requirements.* The safety of CAT III operations is heavily influenced by several characteristics of the ground-based electronic guidance system, which include: the course structure (ILS/MLS signal quality); the integrity (the degree of trust which can be placed on the precision of the guidance signals); and continuity-of-service (protection from loss of the guidance signals) of the system. CAT IIIa operations can only be conducted at locations where the ground-based ILS/MLS provides acceptable glidepath angles, threshold crossing heights (TCH's), and acceptable lateral and vertical course structure down to touchdown. CAT IIIB operations can only be conducted if these requirements are met through rollout. The course structure, integrity, and continuity-of-service required for U.S. CAT III operations are specified in Order 6750.24. The TCH's required for CAT III operations are specified in Order 8260.24.

(4) *ILS/MLS Critical Areas.* The operation of vehicles and aircraft on or near the runway or the ILS/MLS antennas can significantly disturb the course structure of the electronic signal radiated by these systems. Critical areas have been established to eliminate these undesirable disturbances. Vehicles and aircraft must not be permitted within these critical areas when an aircraft on approach is critically dependent on ILS or MLS guidance. The critical areas which must be protected during CAT III operations in the U.S. are specified in Order 6750.16. The ATC procedures for providing critical area protection are specified in Order 7110.65. The signing and marking requirements for the critical areas are specified in AC 150.5340-1 and AC 150.5340-18.

(5) *RVR Reporting Equipment.* The restricted seeing-conditions and the short-term variability in the weather conditions associated with CAT III operations requires the use of RVR reporting systems to provide meaningful seeing-condition reports to pilots. Three RVR reporting systems must be installed at all runways used for CAT III operations. The touchdown zone and mid-RVR reports are controlling for all CAT IIIa operations. In CAT IIIa operations, the rollout-RVR report provides advisory information to pilots. For CAT IIIB operations, the touchdown zone-, mid-, and rollout-RVR reports are controlling. Although three RVR reporting systems must be installed at all runways used for CAT III operations, CAT IIIB operations using fail-operational landing systems

which incorporate a serviceable fail-operational rollout control system, CAT III operations may continue to be conducted in the event any one of these RVR reporting systems is unserviceable. In this case, both of the remaining RVR reports are controlling. Additional information on RVR systems can be found in AC 120-28 and AC 97-1.

(6) *Ocle Clearance Limitations.* Standard CAT III operations can only be conducted to runways which provide adequate obstacle clearance protection in the final approach area, the approach light area, the touchdown area, and the missed approach area. Obstacle protection must also be provided within the obstacle-free zone (OFZ) and the runway safety area which encompasses and surrounds the CAT III runway. These areas are identified in AC 120-29, U. S. TERPS, and AC 150.5300-13.

(7) *CAT III Airports and Runways.* Before authorizing an operator to conduct CAT III operations with a particular aircraft, the inspector must ensure that the operator fully understands CAT III operational requirements and provides the policies, guidance, training, and procedures necessary to address these criteria in company manuals and training programs. The inspector must also determine that the operator's overall CAT III program assures that the following criteria will be met during the conduct of these operations.

(a) Operations must be restricted to only those airports and runways approved for CAT III operations in Order 8400.8. CAT III operations to runways specified in Order 8400.8 as restricted CAT III runways shall be restricted to only those aircraft approved by AFS-400 for operations at that particular runway.

(b) CAT III operations must not be conducted at any airport or runway unless the airport facilities and services meet the following criteria for CAT III operations for the particular aircraft.

(i) The runways used must provide an effective runway field length of at least 1.15 (1.3 for certain CAT IIIB operations) times the landing field length required by FAR 121.195(b) or FAR 135.385(b) for the aircraft being used. These field lengths are necessary to account for the tendency to "land long" due to the characteristics of CAT III landing systems, and also to the pilot's increased difficulty in determining vertical height and in precisely assessing the flare and touchdown point in the reduced seeing-conditions associated with CAT III operations.



(ii) The runways must be equipped with serviceable approach, runway, touchdown zone, runway centerline and taxiway centerline lighting systems as required by this handbook, AC 120-28, and the standard CAT III OpSpecs.

(iii) The runway safety areas, obstacle-free zones, and ILS/MLS critical areas must be adequately protected for CAT III operations.

(iv) The ATC facilities and services must be compatible with the CAT III requirements.

(v) The safety facilities and services (crash, fire, and rescue) must be adequate to support CAT III operations with that particular aircraft (see AC 150.5210-9).

(vi) The weather reporting systems must support these operations and the required RVR reporting systems must be serviceable.

(vii) The aeronautical information system must be adequate for CAT III operations (NOTAM's and ATIS, as well as the status of the airfield, runways, NAVAID's, lighting systems, and RVR reporting systems).

(8) *Approval of Airports and Runways.* The airports and runways approved for CAT III operations for a particular operator and aircraft are authorized in paragraph C60 or H109, of the standard OpSpecs, as applicable. Any restrictions or limitations related to the operation of a particular aircraft at a particular runway must also be specified in these paragraphs. Inspectors shall not authorize CAT III operations to any runway unless that runway is approved for CAT III operations for that aircraft type in Order 8400.8. When evaluating and approving an operator's overall CAT III program, an inspector must consider the program's ability to account for at least the following factors in designating airports and runways to support its CAT III operations.

- The suitability of the runways, runway field lengths, taxiways, and other maneuvering areas on the airport considering the seeing-conditions associated with these operations
- The CAT III instrument approach procedures authorized, and the NAVAID's required for these operations
- Procedures for CAT III protection of the

runway safety areas, obstacle-free zones, obstacle critical areas, ILS/MLS critical areas, and the runway/taxiway incursion prevention procedures (This also includes procedures to control and regulate the ground movement of aircraft and vehicles in these restricted seeing-conditions.)

- The ATC facilities and services required for CAT III operations
- Safety facilities and services (for example, crash, fire, and rescue) required and any special procedures needed for these operations
- RVR reporting and weather reporting/ forecasting services required
- Aeronautical information services (such as NOTAM's, ATIS) required for these operations
- Adequacy of lighting, marking, and other visual aids necessary to support these operations
- Necessity of prohibiting CAT III operations at airports and runways which are not approved for CAT III operations in Order 8400.8

#### *C. Airborne Equipment Required For CAT III Operations.*

(1) *Background.* The airborne equipment required for CAT III operations is based on the "building block" approach. The CAT III equipment requirements are based on the foundation provided by the basic CAT I and CAT II equipment requirements. This subparagraph C only addresses the additional equipment which must be serviceable for CAT III operations. The only acceptable means of obtaining airworthiness approval for CAT III operations is type design approval which is usually obtained during aircraft certification testing.

(2) *Type Design Approval.* The only aircraft which are currently authorized to conduct CAT III operations have been evaluated and approved for these operations during aircraft certification testing. These aircraft have received type design approval for CAT III operations and further operational demonstration of airworthiness is unnecessary. The equipment required to conduct CAT III operations with these aircraft is determined by comparing

the equipment specified by the FAA-approved aircraft flight manual for CAT III operations with the equipment specified in AC 120-28 for these operations. All of the CAT III equipment specified in the aircraft flight manual is required. Any additional equipment specified in AC 120-28 is also required for these operations. Therefore, both the approved aircraft flight manual and AC 120-28 must be considered in determining the required equipment. See volume 3, chapter 1, section 5, paragraph 181, for further guidance and direction for specifying the required equipment in the OpSpecs.

**D. CAT III Pilot Training Program.** The operator's approved training and qualification program must provide the flightcrews with the CAT III skills, knowledge, proficiency, and qualification necessary to safely conduct CAT III operations. The use of the "stabilized approach" concept is mandatory for all CAT III operations (see section 4 of this chapter). It is national policy and direction that all operators should be encouraged to use the "Standard Approach Procedures" for all CAT III operations (see section 4 of this chapter). The training and qualification curriculum changes necessary for CAT III operations are directly related to the need for increased precision in flightpath control due to the reduced seeing-conditions encountered in these operations.

(1) *Initial and Recurrent Ground Training.* The CAT III ground training curriculum segments must include the following:

- Required ground-based visual aids
- Required ground-based electronic aids
- TCH requirements for that particular aircraft
- Required airborne equipment
- Authorized minimums
- Controlling RVR requirements
- Limitations and use of RVR information
- CAT III critical areas and the critical need to protect these areas
- Required crew duties and responsibilities
- Seeing-conditions associated with the transition from instrument to visual flight

- Essential nature of maintaining a full-time instrument reference by one pilot throughout the approach and landing
- Critical nature of proper "eye reference position" (proper sitting height)
- Required pilot training and qualifications
- Methods for determining that the aircraft is airworthy for CAT III operations
- Dispatch/flight release requirements

(2) *Initial and Recurrent Flight Training.* The flight training requirements depend on the equipment installed (autoland or HUD), the operating procedures used, and the kinds of CAT III operation authorized (fail-passive or fail-operational). The primary objective of the flight training is to ensure that the flightcrew has the skills, knowledge, proficiency, and qualifications necessary to meet the operational concepts and criteria for CAT III operations. The flightcrews must also be able to demonstrate inflight, or through an acceptable simulation, the competence necessary to safely conduct these operations. To satisfactorily demonstrate competence, the pilot must successfully accomplish the required maneuvers in accordance with the policies, criteria, procedures and crew duties specified in this handbook, AC 120-28, and the specific operator's operating manuals and approved qualification program. The CAT III flight training curriculum segment must include sufficient flight training to permit pilots to acquire the knowledge and develop the skills and abilities necessary to demonstrate competence in the following areas (see AC 120-28 for additional guidance):

(a) Determination of AH and/or DH, including the use of radio altimeters and, if appropriate, the inner markers.

(b) Recognition of, and proper reaction to, significant CAT III system failures before passing the AH or DH, as appropriate.

(c) Proper missed approach techniques and the expected height loss as it relates to manual or automatic go-around and the go-around initiation altitude.

(d) The use and limitations of RVR information, including determination of controlling RVR and the number and locations of the RVR reporting systems required.

(e) The availability and limitations of external visual cues during the latter stages of the approach, flare, and landing. This includes at least the following factors:

- Proper procedures to be used for unexpected deterioration of seeing-conditions (to less than the authorized RVR) during approach, flare, and rollout
- Achieving the proper eye reference position (proper sitting height) and the expected external visual references with the weather at authorized minimums
- The appearance and expected sequence of visual cues during approaches and landings at the authorized minimums
- The effects of vertical and horizontal wind-shear (in CAT III weather conditions) on system performance, the proper procedures to be used in these windshear encounters, and the wind limitations for these operations
- The proper procedures for transitioning from nonvisual to visual flight
- Recognition of the limits of acceptable aircraft position and flightpath tracking in the approach, flare, and landing with special emphasis on tracking performance in the decision region
- Recognition of, and reaction to, significant airborne or ground system faults or abnormalities during the approach, flare, and landing

(3) *Initial and Recurrent Qualification.* Each PIC and SIC used in CAT III operations must satisfactorily demonstrate the ability to safely conduct CAT III operations to either a company check pilot or an FAA inspector during initial and recurrent CAT III qualification. The events and/or maneuvers which must be demonstrated depend on the airborne equipment installed, the kinds of CAT III operations authorized, and the crew duties and responsibilities used by that operator. See AC 120-28 for a more detailed description of these requirements.

E. *Operations Manuals, Crew Duties, and Responsibilities.* The operator's manuals must contain clear and

concise policy, criteria, guidance, and direction to its flightcrews and other persons involved in its CAT III operations. To be acceptable, these manuals must meet the criteria of the FAR's, this handbook, and the appropriate CAT III advisory circulars. These manuals must adequately address the following:

- Airport and runway requirements, including the additional runway field length required
- Airborne and ground-based equipment required for the various minimums
- Methods for determining that the aircraft is airworthy for the intended operation, including MEL/CDL requirements
- Flightcrew procedures, crew duties and responsibilities
- Instrument approach procedures and minimums authorized
- Pilot training and pilot qualifications
- Any operating restrictions or limitations necessary to safely conduct these operations (see AC 120-28 for further guidance)

F. *Maintenance Program.* Before approving the operator's proposal, the inspector must ensure that the operator's CAT III continued airworthiness program includes the special airborne equipment and procedures required for CAT III operations. Close coordination with the PMI and the PAI is essential before granting operational approval. The inspector shall not issue OpSpecs that authorize CAT III operations until all requirements are met. This includes approval of the operator's CAT III maintenance program for the particular aircraft involved.

G. *Higher Headquarter's Review and Concurrence.* Due to the specialized technical nature of CAT III operations and the need to standardize these operations on a national and international basis, each make, model and series of aircraft used for CAT III operations must be individually approved for each operator. All initial proposals for CAT III operations for each make, model, and series used by each operator must be forwarded to AFS-400, through the RFSD, for their review and concurrence before the OpSpecs can be issued authorizing the operation. Any modifications required for approval of the proposal will be specified in the AFS-400 response to

the proposal. Subsequent proposals for reductions in CAT III operating minimums for that particular make, model, and series of aircraft used by the particular operator also require RFSD and AFS-400 review and concurrence before the reduction can be authorized (see AC 120-28 for further guidance).

**639. OPERATIONS SPECIFICATIONS FOR CAT III OPERATIONS.** CAT III AWTAs operations approvals are granted by issuance or amendments to OpSpecs. The authorizations, limitations, and provisions applicable to CAT III operations for a particular aircraft's

use by an operator must be specified in Part C, paragraph C60 or H109, as appropriate, of the OpSpecs. Inspectors shall not, under any circumstances, issue OpSpecs approving any particular CAT III operation until all requirements are met (including the POI's approval of the operator's CAT III maintenance program for that aircraft) and until the operator is currently capable of commencing safe CAT III operations. See volume 3, chapter 1, sections 5 and 6 for further information related to issuing CAT III OpSpecs.

**640. -644. RESERVED.**

[PAGES 4-261 THROUGH 4-280 RESERVED]